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IS 7728 (1984): Analogue dc current signals for process control systems [ETD 18: Industrial Process Measurement and Control]



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*Indian Standard*  
SPECIFICATION FOR  
ANALOGUE DC CURRENT SIGNALS FOR  
PROCESS CONTROL SYSTEMS  
( *First Revision* )

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**BUREAU OF INDIAN STANDARDS**

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG

NEW DELHI 110002

# Indian Standard

## SPECIFICATION FOR ANALOGUE DC CURRENT SIGNALS FOR PROCESS CONTROL SYSTEMS

### ( First Revision )

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*Indian Standard*  
 SPECIFICATION FOR  
 ANALOGUE DC CURRENT SIGNALS FOR  
 PROCESS CONTROL SYSTEMS  
 ( *First Revision* )

## 0. FOREWORD

**0.1** This Indian Standard ( First Revision ) was adopted by the Indian Standards Institution on 10 August 1984, after the draft finalized by the Industrial Process Measurement and Control Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** This standard, first published in 1975, is being revised to bring it in line with the developments at the international level.

**0.3** The revised standard contains requirements which give specified values for load impedance and power supply voltage. These values were not specified in the earlier standard.

**0.4** While preparing this standard, assistance has been derived from IEC draft document 65A ( Central Office ) 8 consolidated revision of IEC Publications 381 ( 1971 ) and 381A ( 1975 ) 'Analogue direct current signals and process control systems'.

**0.5** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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## 1. SCOPE

**1.1** This standard applies to analogue dc current signals used in process control systems to transmit information between the elements of systems.

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\*Rules for rounding off numerical values ( revised ).

**1.2** This standard does not apply to analogue dc current signals entirely used within an element.

## **2. TERMINOLOGY**

**2.0** For the purpose of this standard, the following definitions shall apply.

**2.1 Elements of Industrial-Process Measurement and Control Systems** — Functional units or integrated combinations thereof, which transduce, process or transmit measured values, controlling, controlled and reference variables.

**2.2 Analogue dc Current Signal** — A direct current signal, which varies in a continuous manner within its ranges, used in industrial-process measurement and control systems to transmit information.

**2.3 Range of an Analogue dc Current Signal** — The range is all values of the signal which lie between defined limits.

**2.4 Lower Limit** — The specified lowest value of the range.

NOTE — The lower limit may be either zero or a finite value. When zero is used, this is called 'true zero'; when a finite value is used, this is called 'live zero'.

**2.5 Upper Limit** — The specified highest value of the range.

**2.6 Load Impedance** — The resultant of the impedances of all connected receiving elements and connecting lines within the signal circuit.

**2.7 Ripple Content of the dc Signal** — The ratio of the peak-to-peak value of the alternating component with respect to the analogue dc current signal range.

**2.8 Signal Circuit Common Bus** — A number of signal circuits may have a common direct electrical connection. This is the signal circuit common bus, which may, or may not, be connected to earth.

**2.9 Power Supply** — The supply which enables a system element to generate direct current signals by supplying the necessary dc power.

**2.10 Ripple Content of the Nominal Power Supply Voltage** — The ratio of the peak-to-peak value of the alternating component with respect to the nominal power supply voltage.

## **3. SPECIFIED VALUES**

**3.1 Ranges of Analogue dc Current Signals** — The ranges of analogue dc current signals shall be as given in Table 1.



**TABLE 1 RANGES OF ANALOGUE dc CURRENT SIGNALS**  
( Clause 3.1 )

LOWER LIMIT mA	UPPER LIMIT mA
4	20
0	20

NOTE 1 — 4 to 20 mA range is the preferred range.

NOTE 2 — 0 to 20 mA range is the non-preferred range.

**3.2 Out of Range Values of Analogue dc Current Signals** — In the case of the preferred range the 0 mA-value is exclusively reserved for indication of a signal circuit or power supply failure. In case of both preferred and non-preferred ranges, the maximum current shall be limited to 20 mA.

**3.3 Ripple Content of the dc Current Signal** — The ripple content of the signal shall not exceed 0.25 percent of the upper limit if the information is carried by the mean value of the signal. If the information is carried by the instantaneous value of the signal, the ripple content shall be specified for the element.

**3.4 Signal Common** — The point in the signal circuit with the lowest potential shall be the signal common. If the signal common is connected to the power supply, it shall be connected to the power supply negative terminal ( or zero volt terminal in case of a bipolar power supply ).

**3.5 Earthing** — If a signal circuit or power supply is to be earthed, the bus with low potential shall be earthed.

**3.6 Load Impedance** — A transmitting or control system element shall be capable of continuously driving any load between 0 and 600 ohms.

**3.7 Power Supplies** — Any transmitting system element using a power supply external to it shall be capable of operating with a power supply voltage which can vary between 18 V dc and 30 dc.

The ripple content of the power supply shall not exceed 2 percent peak-to-peak of the nominal value. The use of stabilized power supplies is possible.

For evaluation and comparison of systems element characteristics a reference power supply voltage of 24 V dc is recommended.

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